

Explaining the Differences between the Mobile Telecommunications market in the EU, USA and Japan

Matts-Ola Wessman, Mikael Tapio, Elisabeth Uhlemann, Tomas Eriksson,
Olav Queseth, Stefan Pettersson and Richard Gold

August 23, 2002

Contents

1	Introduction	2
2	Descriptions	3
2.1	Introduction	3
2.2	Mobile Phone Market	3
2.2.1	Mobile market in General	4
2.2.2	European Market	5
2.2.3	Japanese Market	6
2.2.4	The USA market	8
2.2.5	Technology	9
2.3	The current state of the Internet market	10
2.3.1	European Union	10
2.3.2	Japan	11
2.3.3	USA	12
3	Explanations	13
3.1	Regulation	13
3.2	Standardization	14
3.3	Existing Technologies	16
3.4	Cultural Differences	17
3.4.1	Japan – a high technology culture	18
3.4.2	Europe – a mix of cultures	18
3.4.3	USA – a relatively young culture	19
3.5	Demographics	19
3.5.1	The European Market	19
3.5.2	The US Market	20
3.5.3	The Japanese Market	21
4	Conclusions	22
4.1	Outlook	23

Chapter 1

Introduction

Recently there has been a large interest in telecommunication. Not only have mobile phones, internet and other traditionally "geeky" technologies become part of everyday life. But the general business press has also become interested in the actors on this market. That may be a result of the growing market volumes but also the interests from governments that see the IS/IT industry as important in creating wealth within a country.

This report mainly deals with the actors on the mobile communications market. We try to give the reader a better understanding of the mechanisms in this area by studying differences between regions that are in many ways similar. Another influence when selecting which of the markets to study was the interests of the authors. All are actively pursuing a Ph.D. in some within the area of telecommunication, most of us with a focus on mobile communications.

In this report we also treat the Internet to some extent even though the main focus is mobile phones. The interest is due to a couple of factors. One is that there is a convergence between data communication and mobility. The industry is hoping that mobile data will be the next killer application that will generate large revenues. Another is that there is some degree of substitutability between Internet services and those offered by mobile phones. For example sending text messages can be done by either a mobile phone or via the Internet. Another example is voice communication that can be carried over both the traditional fixed network, mobile networks and over packet networks such as Internet.

We have decided to compare the markets in three regions/countries: Europe, USA and Japan. There are a number of reasons for doing this. One is the aggregate size of the markets. Together they account for a majority of mobile phone use in the world. Another reason is to simplify the analysis of differences between the markets. All countries/regions can be characterised as well developed regions that lead the technological evolution. The people are well educated and have a high standard of living.

Chapter 2

Descriptions

2.1 Introduction

This chapter describes the mobile phone and Internet market in Europe, Japan and the USA with statistics regarding:

- Internet and mobile phone penetration,
- number of subscribers per region and
- number of subscribers per technology.

Penetration is defined as the number of subscribers divided by the population. The number of subscribers is not identical to the number of unique users since, for example, one person can subscribe to two operators or have two mobile phones. Consequently, the market penetration can be higher than 100%. This is not problem in this study since the focus is on if penetration is high, medium or low and not if penetration is 38.9 % or 33.1 %. Since this study compare similar markets, the EU replaces Europe sometimes in this report.

As a reference, Table 2.1 shows the population in the EU, Japan and the USA.

Table 2.1: The population in million in the EU, Japan and the USA [21],[22]

Region	Population(million)
EU	377 (Jan 2001)
Japan	127 (Jul 2001)
US	278 (Jul 2001)

2.2 Mobile Phone Market

This section gives statistics regarding subscribers and technology in the mobile phone market with main focus on Europa, Japan and the USA. First an overall picture is given. Statistics on the three different markets are then presented. Finally, the mobile phone market is outlined from a technological point of view.

2.2.1 Mobile market in General

The market penetration of mobile phones in the EU, Japan and the USA at end of December 2001 is shown in Table 2.2 [20] [18] [17]. A market penetration in the EU is estimated to 62 % based on Table 2.4 and each country's population [21]

Table 2.2: Market penetration of mobile phones in the EU, Japan and the USA

Region	Market Penetration	Dominating Technology
EU	62 %	GSM
Japan	54.9%	PDC, CDMA
USA	38.9%	AMPS, CDMA, TDMA, GSM

The number of mobile phone subscribers in different regions is shown in Table 2.3. The numbers for 2001, 2002 and 2003 are forecasts based on figures from June 2001.

Table 2.3: Mobile phone subscribers worldwide [17]

Millions of subscribers	End 2000	End 2001	End 2002	End 2003
Africa	16.6	29.1	48.7	68.1
Americas	63.6	92.7	132.5	170.6
Asia Pacific	232.1	330.6	442.1	558.8
Europe: Eastern	29.5	45.7	61.8	77.0
Europe: Western	260.2	336.4	423.3	488.8
Middle East	10.4	15.1	20.1	26.3
USA/Canada	116.5	139.1	164.5	190.7
World	728.8	988.7	1,293.0	1,580.2

2.2.2 European Market

In Europe, the dominating standard is GSM. Each country usually has several mobile operators competing with the incumbent operator. Roaming agreements between different operators in different countries are well developed. The market penetration of mobile phones in Europe is shown in Table 2.4.

Table 2.4: Market penetration of mobile phones in Europe on 31 December 2000 except Albania 31 Oct 2001 [20]

Country	Market Penetration	GSM launched	Operators
Albania	10.0%	2001	2
Belgium	54.4%	1994	3
France	49.3%	1992	3
Germany	58.3%	1992	4
Greece	55.4%	1993	3
Hungary	28.0%	1999	3
Ireland	63.4%	1993	3
Italy	74.7%	1995	4
Malta	26.3%	1997	2
Netherlands	66.8%	1995	5
Poland	16.9%	1996	3
Portugal	63.0%	1992	3
Romania	10.8%	1997	4
Spain	62.0%	1995	3
Sweden	73.8%	1992	3
Switzerland	63.1%	1993	4
United Kingdom	67.8%	1992	5

2.2.3 Japanese Market

In Japan, there are four mobile phone operators with 69.8 million subscribers. All figures regarding Japan in this subsection is from [18]. NTT DoCoMo is the incumbent operator and is the largest mobile phone operator with approximately 41 million subscribers. See Table 2.5.

Table 2.5: The number of subscribers to each of the four operator in Japan

Operators	Apr 02
NTT DoCoMo Group	41,056,000
AU (KDDI)	12,410,400
TU-KA Group	3,895,700
J-PHONE	12,405,400
Total	69,767,500

The Japanese market can also be seen from a technological point of view. There are four competing technologies PDC, CDMA, WCDMA(UMTS) and CDMA2000 with PDC as the most used technology. PDC and CDMA are 2G systems and WCDMA and CDMA2000 are 3G systems. Table 2.6 shows the number of subscribers to each technology and operator. Notice that in 3G systems AU group with CDMA2000 had three times more subscribers than NTT DoCoMo with WCDMA. Clearly, the Japanese authority allows both CDMA2000 and WCDMA.

Table 2.6: The number of subscribers to each technology and operator in Japan

System	Groups	Apr 02
PDC	NTT DoCoMo Group	40,951,000
	au Group	1,225,000
	TU-KA Group	3,895,700
	J-PHONE	12,405,400
	PDC Subtotal	58,477,100
CDMA	au Group	10,851,200
WCDMA	NTT DoCoMo Group	105,500
CDMA2000	au Group	334,100
Total		69,767,500

In Japan, there are 52.9 million subscribers to three different services in order to have access to mobile internet: i-mode, EZweb and J-sky. As seen in Table 2.7, i-mode has 32.6 million subscribers making this service the most popular one.

Table 2.7: The number of subscribers to three different services for mobile internet in Japan

Services	Apr 02	Groups
i-mode	32.6	NTT DoCoMo Group
EZweb	10.0	AU Group 8.5 million TU-KA Group 1.5 million
J-sky	10.3	J-PHONE
TOTAL (million)	52.9	

2.2.4 The USA market

The population in the USA is approximately 278 million. In December 2000, the market penetration of mobile phones in the USA was 38.9% which is low compared to Europe and Japan. In the USA, FCC allows several competing technologies as, for example, CDMA, GSM and TDMA. Compared to Europe, there are few roaming agreements between operators in the USA. The person who accepts an incoming call in the USA also pays for that call which is not the case in Europe. Table 2.8 shows the number of mobile phone subscribers to operators in end of September 2000, [17].

Table 2.8: The number of subscribers to each operator in the USA

Operator	no of subscribers
Verizon Wireless	26,300,000
SBC	13,025,000
AT&T Wireless Services	12,631,000
Sprint PCS	8,348,000
BellSouth Mobility	6,151,000
Alltel/360 Communications	6,009,090
VoiceStream	3,067,900
USCC	2,890,000
AT&T Wireless Partners	2,366,000
Western Wireless	976,500
Powertel PCS Partners	803,000
Qwest Wireless	691,000
Telecorp PCS	405,440
Triton PCS	361,590
Tritel Communications	156,100
Others	11,535,170
Total	95,716,790

2.2.5 Technology

According to GSM World [16], there were 1005.3 million mobile phone subscribers in April 2002. Digital systems is totally dominating with a market share of 97 %. Today, there are four incompatible digital standards GSM, CDMA, PDC and US TDMA on the market. All of them belong to what is called the second generation mobile systems or 2G.

GSM most widely used and has 684.2 million subscribers or 70 % of the digital phone market. The number of subscribers to each technology over a 2 years period can be found in Table 2.9. The number of subscribers in different regions to GSM and CDMA can be found further below. PDC is only used in Japan and more information about PDC is found in Section 2.2.3.

Table 2.9: Subscribers per technology in million, [16]

Subscribers per technology	Dec 00	Jun 01	Dec 01	Apr 02
GSM	455.1	550.1	646.5	684.2
CDMA	82.2	96.8	112.2	123.4
PDC	50.8	54.2	56.8	58.7
US TDMA	65.2	80.9	94.7	100.7
Total Digital Subscribers	653.3	781.9	910.2	967.2
Total Analogue Subscribers	68.0	55.3	45.3	38.1
Total Wireless Subscribers	721.3	837.2	955.5	1005.3

GSM

GSM is totally dominating in Europe with 357.1 million subscribers in April 2002. There are 14.7 million subscribers in North America and 249.9 million in Asia Pacific using GSM. The number of subscribers using GSM in different regions is shown in Table 2.10.

Table 2.10: The number of subscribers to GSM in million in different regions [16]

GSM Regions	Dec 00	Jun 01	Dec 01	Apr 02
Arab States	10.4	13.9	17.3	18.7
Asia Pacific	133.7	180.4	226.1	249.9
Africa	10.8	13.3	16.6	19.8
East Central Asia	2.2	3.2	4.1	4.5
Europe	281.3	317.1	354.3	357.1
Russia	2.3	3.6	5.7	8.6
India	3.1	4.1	5.4	6.7
North America	9.6	11.6	13.5	14.7
South America	1.7	2.8	3.5	4.2
Total (million)	455.1	550.1	646.5	684.2

CDMA

CDMA has almost 53 million subscribers in North America and 44 million in Asia Pacific. For each region, Table 2.11 shows how the number of subscribers.

Table 2.11: The number of subscribers to CDMA in different regions [19]

Number of CDMA Subscribers	Dec 00	Jun 01	Dec 01	Mar 02
Asia Pacific	35,730,000	39,906,000	41,380,000	43,480,000
North America	28,700,000	37,952,000	48,421,000	52,890,000
Caribbean & Latin America	14,950,000	17,230,000	19,900,000	22,023,000
Europe, Middle East Africa	1,060,000	1,225,000	1,650,000	1,825,000
Total	80,440,000	96,313,000	111,351,000	120,218,000

Third Generation Mobile Phone Systems

The third generation mobile phone system normally abbreviated as 3G is actually 5 different technologies that have been approved by ITU as IMT-2000. The 2 important ones are UMTS(WCDMA) and CDMA2000. In Europe, 3G has become equal to UMTS. CDMA2000 is a development of CDMA. Notice that the first commercial network using 3G opened up in October 2000 in Korea using CDMA2000. According to CDMA Development Group (CDG), there were 7.6 million subscribers using CDMA2000 in March 2002. Table 2.12 shows the increase in number of CDMA2000 subscribers.

Table 2.12: The number of subscriptions to CDMA2000 [19]

Number of CDMA2000 Subscribers	Jan 01	Jun 01	Dec 01	Mar 02
Total	16,000	418,000	3,650,000	7,604,000

2.3 The current state of the Internet market

Here we describe the current state of the Internet market in three geographical regions: The European Union, Japan and the USA. We concentrate on describing the current state of internet penetration in these markets, the structure of these markets, accessibility to the Internet and additional supporting information.

2.3.1 European Union

According to a recent Eurobarometer study [22], the current percentage of the EU population that is online stands at 35%. These users have the choice of over 622 different ISPs as stated by the CIA World Factbook 2001 [21].

The structure of Internet access in the EU can be categorized as predominately modem dial-up connections with a very low percentage of users with broadband access. Modem dial-up is still the most common form of access as broadband has been held back by the incumbents who own the infrastructure i.e., mainly nationalized or recently

privatized PTTs, as according to a Jupiter MMXI survey: “Broadband will grow slowly in Europe” [37]. These incumbents lay the blame squarely on the consumers, however, for not knowing about the benefits of broadband. Concern is warranted from the industry as current figures available from Forrester [38] show that 96% of internet users are still on modem dial-up Internet connections and slow take up of broadband is predicted.

Growth in the broadband market is predicted in the medium term future, however. Frost & Sullivan have conducted a survey in which they reported that there will be 28.1 million broadband subscribers in Western Europe by 2008, up from 3.8 million broadband subscribers in the region at the end of 2001. This was reported by BBC News [41].

It is difficult to categorize the Internet market in the European Union market as it is comprised of 15 member countries with wildly varying incomes, cultures and markets. For example there is typically high penetration in Nordic countries, but low penetration in Southern countries, from 73.5% in Sweden to 12.9% in Greece [21].

Analysis indicates that high income per capita and liberalized telecommunications market are the strongest factors for a large Internet access market.

2.3.2 Japan

The office of National Statistics puts the current Japanese population at 127 million. Of this, 37% are online according to the ETO [22]. What is unusual for Japan compared to other economic regions is the number of online users which are connected via mobile phones. The Telecommunications Carriers Association puts this number at 53 million. The CIA World Factbook 2001 [21] lists the number of fixed line telephones at 60.39 million and mobile cellular phones at 63.9 million which partially explains the high penetration of mobile internet in Japan. These users, both of mobile and fixed networks have the choice of 73 different ISPs.

IDC [39] have predicted that the total number of Internet accounts, including overlaps i.e., users who have both fixed and mobile internet accounts, will grow annually by 28.5% to reach 230 million in 2005. Mobile subscriptions were expected to make up 86.3 million of those accounts.

The Newsbytes [40] online magazine quotes that in Japan there are 19.95 million dial-up users in 2001 which is up from 10.59 million at the end of 1999. However, this slowing of the growth in dial-up accounts during 2001, as broadband services became increasingly popular. This relatively slow adoption of Internet in Japan is commented on by the Nonprofit Japan Organization: “This local toll charge is a major obstacle to the proliferation of the Internet in Japan.” [42].

Broadband is beginning to take off in Japan despite the original slow start of fixed internet. The Multimedia Research Institute has reported that the number of ADSL users in Japan has reached 2.08 million in February 2002, which has increased from 1.52 million at the end of 2001. The Multimedia Research Institute has also revealed that the number of users subscribing to broadband via cable TV as opposed to ADSL has also increased from 1.30 million in December 2001, to 1.39 million by the end of February 2002.

Japan is also currently investing aggressively in Internet service provision. For example, In March 2001, CNET indicated via Nua [45] that the Japanese government had announced a \$16.7 billion five-year plan aimed at increasing Internet access and encouraging competition in the country’s telecommunications industry. As mentioned by the Nonprofit Japan Organization [42] It was general opinion that the domination of

the Japanese market by NTT DoCoMo and the high connection cost and also high local call charges have been a major obstacle to the further spread of Internet use in Japan.

2.3.3 USA

In the USA the percentage of the population that is online is 59.7% and this internet-connected population has the choice of 7800 different ISPs [21]. Internet access is also increasing rapidly, according to a CyberAtlas [43] survey from February 2002: Internet use in the USA was growing at a rate of 2 million new Internet users each month.

The dial-up internet market has been large in the the USA partly due to cheap or free local calls which thereby reduced the barrier to entry. Also aggressive marketing strategies by large companies such as AOL and MSN who threw large marketing resources in the form of large advertising campaigns which gave away hundreds of free CDs containing the respective companies Internet access software.

Broadband is also an expanding market according to the Yankee Group [44]. They estimate that the US market for broadband will continue to grow in both subscribers and revenues over the next 5 years. In fact they predict that by 2006, 45 million residential and business customers in the US will have subscribed to cable modem and DSL services. This is a substantial increase in broadband penetration over a reasonably short period of time.

Chapter 3

Explanations

3.1 Regulation

If one looks up regulation in the Merriam Websters [23] dictionary one can read "an authoritative rule dealing with details or procedure" and "a rule or order issued by an executive authority or regulatory agency of a government and having the force of law".

In this report regulation is used to describe the rules and restrictions that are forced on the firms active in the mobile communication markets by government ministries or by independent regulators formed by the government.

The last decades the telecom market has been liberalised in various countries around the world. At the same time governments have separated the regulatory functions from the operator functions of the old government owned monopolies. The reason has been to adapt to a competitive market place where it makes sense to have a regulator with no direct interest in the telecommunication market.

There are two models for separating the regulatory functions from the telecommunication operator. The most popular one is to establish a regulatory body that is independent from both the government arm responsible for communication and the telecommunication operation business [24]. The telecommunication operations are privatised and the government becomes the main shareholder. The other method is full privatisation of the incumbent operator. Then the government can be independent from the operator, but in most cases the government has remained the major shareholder.

In Japan the regulator and the policy maker is the Ministry of post and telecommunications (MPT). In 1985 the Japanese incumbent operator NTT was partially privatised which opened up to competition in the long distance service market [25].

In USA the Federal Communications Commission (FCC) acts as the regulatory body. The FCC and the National Telecommunications and Information Administration (NTIA) of the Department of Commerce together set the policies. Deregulation in USA started quite early. According to Noam [26] the liberalization path begun in 1956 when FCC allowed equipment to be connected to the (telephone) network that had not been manufactured by the incumbent operator AT&T. The liberalization of the telecommunication market in does not go as far back into time. By 1993 only Belgium, Norway, Sweden, Switzerland and UK had independent regulators. This number had increased to 22 by 1999 [24].

The early start of deregulation in the US may explain the large number of long distance operators there. However the explanation is more complex than that. For

example in Finland the existence of 800 operators has historical reasons [27].

ITU is the global forum for interstate cooperation. It was established last century as an impartial organization for interstate for planning and standardization of telecommunications. It is part of the United Nations [28]. For mobile telephony the allocation of frequencies to use for communications is critical. The Radio communication sector of the ITU coordinates the frequency allocations of the radio spectrum. The agreements between states are drawn up in the Radio Regulations, which is a document that describes which frequency bands can be used for different services. The radio regulations are changed by an international assembly known as World Radio communications Conference (WRC). These meetings are held every two to three years [29]. The individual governments or regulators have agreed to implement the decisions of the WRC. However there are possibilities to obtain exceptions if there are very good reasons for such exceptions or if it is unlikely that it will cause interference to the radio communication in other countries.

For the third generation mobile system also known as IMT-2000 the ITU has managed to find frequency allocations that are the same all over the world. That was not the case when the systems of the first and second generation was standardized and the frequencies for them were allocated. This has resulted in problems with roaming from one country to another.

The rules for bands allocated for the mobile communications in the US was not very strict compared to Europe. In the US it was up to the operator to choose technology, but in Europe and Japan only one technology was allowed in the mobile communications bands. This created problems with roaming in the US since the technologies chosen for different networks generally was not compatible. Since roaming was not possible the value perceived by the customer was not perceived to be as high and thus hampered the introduction of cellular phones in the US.

3.2 Standardization

A standard is an accepted or established rule or model, i.e., a set of agreed on principles and practices. Different telecommunication industry standards may specify a networking standard or a specific technology standard. Most standards are voluntary, i.e., not imposed by legislation, but everything works better if many producers agree on them.

A producer participates in the standardization procedure so that its products will be acceptable in the market upon adoption of the standard. The benefits to participation in standards work are, for example, influence over the content of the standard, and early knowledge of the content of the approved standard, before approval. The producer will start benefiting from the content of the standard before its publication. When comparing the different markets in Europe, USA and Japan it can be noted that the standardization work has influenced their current status. Europe consists of several countries, all with different legislation. The national market is in general too small for most companies, so many medium sized international companies co-exist on the same market. Consequently, the companies in Europe have a history of cooperation and standardization work. In Japan, the DoCoMo has had a monopoly status for a long time. This big government owned company has traditionally defined and set the standards. In the USA, this kind of government regulations is very unpopular. Big commercial companies set their own standards. Since the national market is relatively big, several well-established companies control different parts of the American market, and hence several standards may be in concurrent use.

GSM (Global System for Mobile Communications) was developed in Europe. Like the TDMA Interim Standard IS-136 (also called Digital AMPS or D-AMPS), GSM's air interface is based on TDMA technology. Although GSM technology has a lot of similarities to IS-136, it developed along a very different path. In the United States, the FCC moved the industry from one single analog standard to a new generation of multiple competing digital standards. Europe, on the other hand began with five incompatible analog air interfaces scattered around the continent. In the 1980s, momentum increased to build Europe's global influence as an economic block by integrating economically. As part of that movement, in response to a European Commission directive, international agreements were devised to develop a single international open, non-proprietary digital cellular standard, with the most important goal of seamless roaming in all countries. New spectrum at the 900 MHz band was set aside for cellular service. In 1982, the Conference of European Posts and Telecommunications (CEPT) held a meeting to begin the standardization process. This meeting established the Groupe Special Mobile standards body, or GSM. During 1985, the Consultative Committee of International Telegraph and Telephones created a list of technical recommendations, and from these, through a notable cooperative effort, the GSM specifications were created. In 1987, all parties agreed to a framework of a compatibility specification, with an air interface based on hybrid FDMA (analog) and TDMA technologies. The GSM standard became the responsibility of ETSI, the European Telecommunications Standards Institute.

Due to the geographical and political structure in Europe, producers on the European market have a long tradition of cooperation towards pan-European consensus. Each country in Europe is a relatively small market by itself, so most companies are established in three or four different countries in Europe. This yields an interest in participation in standardization procedures so that the developed products can be used in as many countries as possible. A long phase of reaching consensus will give competitors a head start. This is of course no issue if there are no competing standards [1]. Instead, pan-European standards are seen by the European governments as a method of strengthening the competitive advantages of the European industry in relation to the industry in Japan and USA. The end users in the European mobile phone market can enjoy the standards in that their cell phones will work properly all over Europe despite what cell phone brand or what particular operator they use. Since the competition between companies cannot be based on the particular technology used, focus is instead on minor extra services, brands and price differences of the service provided. The problem is also that the particular standard adopted is not necessarily the best technical solution, but may have been appropriate for some reason.

North America currently has a multitude of digital cellular technologies for wireless radio communication, collectively referred to as PCS or Personal Communications System, each with different coverage and capacities. The FCC has played a large role in the development process and deployment of PCS technologies in the US. In contrast to the European development, competition among industry players, not cooperation, was the objective. There was no mandate for a national unified approach. In the late 1980s the Qualcomm Corporation proposed and developed a CDMA system. In 1993, the Qualcomm CDMA system was modified and adopted by the Telecommunications Industry Association as the IS-95. Several network operators adopted this standard with plans to adopt CDMA for dual-mode operation with analog at both the 800 and 1900 MHz frequency bands. In 1996, commercial systems began operation.

The competition between companies and the individual development of standards within each big company are common phenomena in the US. Due to the eagerness of large industries to get their existing structures standardized, the USA has a history of

incompatible networks and different providers for long and short distance telephone calls. The end user has a number of different technical solutions to choose from and it can be hard to determine which is the best one. Also calling or sending short messages to friends and relatives in other states may be infeasible due to incompatible networks. The large companies dictate the rules and the end user can do little but change company.

In Japan, the previously government controlled DoCoMo still dominates the market and standards were traditionally outlined and adopted through this company. However, the national Japanese market is no longer big enough. Consequently, Japanese telecommunication companies are increasingly interested in cooperation in order to participate in the development of new standards. They actively partake in the development of the 3G networks standard, due to the fact that companies are running out of capacity at the national market. The Japanese end user has had little or no chance of influencing the cell phone market. The government traditionally controls most of the market and competition between companies is limited. However, when the Japanese companies now tries to participate in the global standardization procedures, this means that the Japanese market also will become open to foreign companies. The Japanese end user is an interesting customer since he, in general, has a lot of money to spend on technical gadgets. This is partly due to the reasonable salaries, but mainly because housing in Japan is very expensive, since the country is quite crowded. This, in turn, results in people living in rather small apartments and children staying with their parents a long time. Consequently, a smaller part of the salary is spent on housing, as compared to the average American who spends a lot on his house.

3.3 Existing Technologies

As mentioned in the previous section, the companies involved in standardization are likely trying to influence the standardization process with their knowledge and their existing product lines. This is maybe not as dramatic as it sounds. The company believes in their ideas and product and will of course promote them. This could make the development of the market for communication technologies. Companies are not keen on changing a winning concept and will often not compete with themselves [12]. This could either slow the development of the market or cause problems for the companies. The companies could very well miss a technology transition even if they are operated perfectly in the old market.

The existing communication technologies in a country or an area will also have an impact on different tele-economic issues. Penetration of fixed telephony in different countries has for example impact on the development of mobile telephony penetration. It is difficult to predict future of mobile phone penetrations in different areas. One idea has been that countries without a traditional telecom infrastructure should jump ahead in the development of mobile solutions. This has not yet taken place [13]. The following bullets are facts from ITU World Telecommunication Development Report 1998 and they show that the mobile subscribers are very much concentrated to the industrialized countries.

- In 1960, there were approximately 100 million telephone fixed lines in the world. Since then, the number of connections has grown between 4 and 7% annually. By the beginning of 2000, there was some 1 billion fixed lines globally

- By the beginning of 1997, 62% of all global telephone connections existed in 23 developed countries, together representing 15% of the global population
- 90% of all households in the industrialised countries have at least one telephone connection. In the developed part of the world, 16% of the households have one telephone connection. 65% of all households, equivalent to 950 million, have no telephone at all.
- 84% of all mobile subscribers, 91% of all fax machines, and 97% of all Internet host computers were installed in the industrialized countries by the beginning of 1997

The highest penetration of mobile phones is in the Nordic countries, where the penetration of fixed telephony is also very high. There is a very low increase in fixed telephony in the Nordic countries since the penetration is so large and the focus is on mobile phones instead [13].

Companies will also try to keep their current customers (subscribers in the mobile phone case) when shifting technology. Subsidizing and locking methods (e.g. SIM-locking) are means to keep old and get new subscribers. Operators may have a type of subscription (pottabonnemang) which regular payment can be saved for later use on the subscription account. The fees are accumulated if not used. This will cause locking effects on the subscribers. The amount of money saved on the accounts could be substantial and will make subscribers reluctant to change operators. This type of subscription was also used by Telia to force subscribers to stay with Telia in the transition from NMT 900 to GSM in Sweden [14, 15]. When the Swedish operator ended the NMT 900, subscribers were tried to be kept within the company when switching to GSM and not selecting another operator. "Pottabonnemang" can also be transferred to refill cards or similar and will cause locking effects. Subsidizing mobile phones is also very common. Operators subsidize the mobile phones in exchange for long subscription times. The phone is locked to a specific SIM-card for a certain time. During this time the phone can not be used with another operator.

3.4 Cultural Differences

When trying to find explanations to market differences in various countries, it is important to look into cultural differences. Culture is about how people live, behave, think and communicate – supported by customs, ideals, beliefs and attitudes. For example, one might find answers to questions like “why is the mobile phone or Internet penetration larger in some countries than others?” by asking questions like “is the social need for belonging higher in some cultures than others?” or “is the ideal for the individual to be different from one to the other – the need of not to belong higher?”. Perhaps some cultures are more susceptible to new trends than cultures with more conservative ideals. One can elaborate a lot around culture and its impact on; for example, the Internet and mobile phone market, and in this section we just try to find some possible explanations to the previously discussed market differences. The focus is on users of technology and not on how culture effects the way decisions are made in companies or the way companies are organized.

3.4.1 Japan – a high technology culture

Japanese love their electric gadgets and wireless communication devices. Can this be explained by the Japanese culture? What we know about Japanese culture is that Japanese people tend to put the needs of the group before those of the individual [30] which also is consistent with the observation that personal interrelation is visible in youth education and numerous group activities [31]. This interrelation encourages a feeling of belonging and perhaps this feeling becomes a need especially among young people. This can be one explanation to why the use of wireless communication devices has become such a success in Japan.

Japanese people also tend to spend a lot of time commuting between home and work/school. As a result, mobile communication devices such as mobile phones and hand-held computers (PDAs) have become very popular. Using these utilities they can access email, home banking, news etc. [32].

The Japanese want the high-end technology and thus, are willing to pay for it. In Japan there is a high level of disposable income and this income is spent on gadgets and wireless devices. So it is little wonder that technology moves at a higher rate to keep up with the demand. For example they can pay a lot of money for a service that every month sends a new logo to their mobile phone.

The Japanese' use of electronic gadgets and games can also be seen as a form of leisure activity. This can be explained by that Japan is an overcrowded country with limited space and therefore sporting, hiking and other outdoor leisure activities are not always an option. Even social activities such as dating is available using mobile dating and personal add services, which is very popular in Japan.

One can also find that Japanese people use SMS more frequently than Europeans and Americans [33]. SMS may be found less intrusive and a more polite way of communicating using asynchronous communication. This politeness goes hand in hand with the politeness that is breed into the Japanese culture.

3.4.2 Europe – a mix of cultures

Since Western and Northern Europe consists of many countries, each with their own long history, strong culture and identity, it is hard to generalize.

When releasing new products on the European market, the European consumers are basically critical and tend to focus on the possible disadvantages of the product first. The enthusiasm for a new product rarely creates a boom in demand in Europe, while it often happens in Japan. When introducing new products in Europe, it is better to focus on rational arguments than addressing emotions [31].

While Japan is more of a collective culture (identify with groups), European cultures tend to be more individualist (individual uniqueness is valued) [34]. Therefore, in Japan it is more likely that if one person "has it" the others will follow, whereas it might have the opposite effect in Europe. Because what individualist wants to have the same product as the next person?

Another possible mean of defining differences is the fact that Europe consists of so many countries, cultures, languages and monetary values. Therefore there is no collective Europe (Although EU tries to unite Europe) as compared to Japan and USA which are in themselves complete countries.

As the average income is lower in Europe than in Japan, Europeans have less money to spend on mobile services [33]. The disposable income (although lower) is used towards houses, cars, boats, recreation, etc.

3.4.3 USA – a relatively young culture

While Japan and Europe has a long history with a deeply routed culture, the first European settlement was in America during the beginning of the 17th century. The American history and already the hardships of the first settlements have created a strong “we” feeling among the Americans and a strong belief in themselves.

Modern American culture owes much to marketing strategies mass-production techniques, and if you can name it, American companies have invented, packaged and disseminated it to as many consumers as cheaply and conveniently as possible [35]. Cheaply being the catch word. Americans are not willing to spend money on the best technology, yet will buy something mediocre, which does the job without spending money on it (as opposed to the Japanese).

The U.S. culture is in many ways similar to the European one, and together they form what we call the “Western culture”. Although one difference between Europeans and Americans is that Americans live for their work and Europeans work to live. Americans are also known to be very ambitious, focused on their work and for thinking “Big”. Perhaps this thinking leads Americans to spend their money on big houses, big cars, etc, rather than, as compared to the Japanese, on mobile communications and technologies.

America is a huge sporting nation, and sports such as baseball, football and basketball dominate the culture. As stated in the previous paragraph, Americans tend to work a lot, thus having little time for leisure. The leisure time that they do have, Americans put towards enjoying and perhaps playing sports.

Americans are more into paging while Europeans and Japanese send more SMS [36]. The difference being that when sending a SMS one has to type in a message on an awkward keyboard, which takes a considerably longer time compared to leaving a voice message on a pager. As all Americans perfectly know: “time is money”.

3.5 Demographics

In this section the demographic aspects of the mobile phone market and the Internet market are going to be analyzed. First some basics facts are presented, serving as the background. Then the market differences will be analyzed. The EU market, US market and the Japanese market will be compared. We start the section by giving some basic demographic facts [5].

3.5.1 The European Market

Regarding the new Information Technologies, such as mobile phones, Internet access, online shopping etc., the European market is very heterogeneous. Thus it is difficult to see this region as only one market. This is also clear when conferring the footnotes of Table 3.1 above. According to [6] the European market can be divided into three different parts; the fast lane (including e.g., Sweden and UK), middle-of-the-road (e.g., Finland and Germany) and the slow lane (e.g., France and Spain). In [6] it is stated that Swedish consumers are more than twice as other Europeans to be online.

Why is this so? One simple explanation is that state-of-the-art technology is expensive. Countries with higher income per capita, and also with a more liberal telecommunications market, are more likely to have high rates of technology ownership and use [45].

	EU	US	Japan
Total population [million]	377	278	127
People in ages 0–14	17% ¹	21%	15%
People in ages 15–64	67%	66%	69%
People in ages ≥65	16% ²	13%	16%
Population density [Inh/km ²]	117.5 ³	28.1	333.3
Gross Domestic Product per head	19040 ⁴	27561	22402
Consumer spendings on leisure, entertainment, etc.	8.8%	10.3%	10.7%

¹Country with highest share of young people: Ireland. ²Country with highest share of old people: Sweden. ³Highest: The Netherlands, 378.2; Lowest: Finland, 15.2. ⁴Highest: Luxembourg, 35980; Lowest: Greece, 14277.

Table 3.1: Demographic facts for EU, US and Japan.

By comparing the geographical locations of the different segments it is clear that most countries from the fast lane are from northern Europe, whereas most of the countries in the slow lane are from the southern part. This can explain the low usage of the Internet in the southern part, since the weather conditions invite more to outdoor activities in contrast to stay inside and e.g., browse on the Internet.

Then one could for the same reason argue that the usage of mobile phones would be higher in the southern parts since more people spend more time outdoors. This, in turn, would create a need for wireless medias of communication. Since this is clearly not the case, other explanations must be found.

One explanation can be found when comparing the levels of education in the countries in the different regions [45]. In Sweden 77% of the population has a studied at the University level, whereas the numbers for Italy and Spain are only 34% and 38%, respectively. Thus, it is likely to believe that higher education drives technology interest and use.

3.5.2 The US Market

When using different demographic measurements, the US has many similarities to Europe. However the US market is more homogeneous. When looked at as a whole, it lacks both extreme points (e.g., Sweden as an example from the fast lane segment and Italy from the slow lane). However regional differences can, of course, be found. Alas, finding facts regarding this matter has been difficult.

In [8] the usage of mobile telephony based on the age of the users is explored. It is clear that young people adopt to new products more quickly than older people. It is also stated that the services for future mobile applications will be focused on the younger generation, since they have already adopted to a mobile habit and thus are more willing to accept new technologies such as future mobile Internet services—this statement is, in general, true for young people in all three regions which we compare. Once a habit is created it is hard to break. This factor contributes in particular to the younger generation. Also the younger generation segment is the highest monthly spending group.

Like in Europe the ability to pay for the services is also a factor that affects the usage of mobile devices. In the US, companies are more likely to pay for (at least half

of) the monthly mobile phone charges of their employees. However, the trend in the US is that an increasing amount of people are using a mobile phone for personal purposes, see Table 3.2, from [9].

Purpose	1990	1994	1999
Business	60%	45%	30%
Personal	40%	55%	70%

Table 3.2: Purpose of mobile phone calls in the US.

3.5.3 The Japanese Market

The Japanese market is different in many ways. For example the share of women using the Internet is 42% which is much larger than in the US. Also the users tend to be even younger. 76% of the Internet users in Japan are in their 20s and 30s, while only 60% of the users in the US are in the ages 18–54, see [10]. These numbers are consistent with the number of mobile phone users.

However the total number of personal home computers is very low (only about 20%) compared to other industrial countries. In [11] a number of explanations are given. For example, the prices for PCs are considerable high. The population density is high, but still wired infrastructure is expensive to install. Also, in Japan homes are very small and people tend to live with their parents long. This creates a need to spend much time outside the home and since Japan, in contrast to southern Europe, has a high technology awareness, the need for mobile devices for communication, leisure and entertainment, or just as a pure fashion accessory, is high.

Thus the market for smaller, portable, devices for accessing the Internet—or the wearable wireless web, WWW, as they call it—is big. In [11] it is stated that demographics is (perhaps) the most important animus behind the unwired revolution of Japan.

Chapter 4

Conclusions

This report has described several tele-economic issues regarding the mobile telecommunication markets in Europe, USA and Japan. These markets have both similarities and differences. The focus of the report is mainly on the mobile phone markets and from a vendor perspective. This chapter will conclude and summarize our findings and briefly look forward into the future.

We have seen that one can find a lot of explanations to market differences in different countries by studying the differences in culture. For example, we found that Japan has more of a collective culture, while the European and American cultures are individualist. With the difference that it might be easier to create hypes, trends and needs for new technology and services in Japan than it would be in Europe and the USA.

There is a general trend of telecom market liberalisation and deregulation in the regions we have studied. It seems to be a correlation between the time the market has been deregulated and many actors there are on the market and their market shares. The longer time the more diverse the market is.

The European market has a long history of standardization procedures. Each country in Europe is a relatively small market by itself, so most companies are established in three or four different countries in Europe. This yields an interest in participation in standardization procedures so that the developed products can be used in as many countries as possible.

Existing communication technologies will also have an impact on tele-economics. Companies with a customer base will try to keep these customers with different methods when shifting to a new technology. Locking effects can appear if competition is not present and may in some cases need regulation to be prevented.

In the United States all kind of government control is disliked and the big American market is instead controlled by large companies with different geographical locations setting their own standards. This leads to a number of coexisting incompatible networks. So far, the American market has been big enough not to be concerned with other countries and their standards.

Japan has a large, previously government owned, company that has set the majority of the existing standards, so far. However, the Japanese market is relatively small, so most companies are now actively participating in standardization procedures in different parts of the world to increase the usability of their products.

From a demographic point of view, the heterogeneous European market can be divided into three parts; high, middle and low mobile phone / Internet penetration. The conclusion is that the high income and high technology awareness consumers of

northern Europe lead the market.

In the US an increasing number of users buy a mobile telephone for personal use, although, as a whole, the numbers are still lower than in Europe.

The success of new mobile and wireless technology services in Japan can be derived from the very high technology awareness. Also, houses and apartments are small and the prices for home PCs are still high.

4.1 Outlook

Globalization will very likely make many of the differences between different countries smaller. Technologies in the information society spreads news very fast and makes people connect over distance more easily. Standardization are also more and more a global and joint effort. Cooperation in standardizing new technologies can result in smaller differences in telecommunication markets around the world. Even though there will not be a single world standard, countries will very likely come closer in thinking and technology.

Some unique and special cultural differences will of course remain the same e.g. the Japanese technological interest will not vanish over night. Attitudes will also remain intact in different countries. In the US, the entrepreneurship have often produced new technological products faster than in other countries. This have often caused several incompatible product on the market. The mobile phone penetration is probably lower in the US compared to Europe because of the number of different technologies in the mobile market. In Europe, the organizing attitude of the northern countries have often tried to standardize the technology before rollout. A success story of this way of technology development is of course GSM. It remains to be seen how successful the next generation mobile communication system will be.

Bibliography

- [1] A.G. Oest and A. Henten. "New standardisation for a and their relationship with traditional standardisation organizations". Communicate2000.
- [2] <http://www.gsmdata.com/es53060/history.htm>
- [3] <http://about.com/>
- [4] <http://www.gsmworld.com/>
- [5] European Commission, "A Community of Fifteen: key figures," Directorate-General for Education and Culture Publications Unit, European Communities, Brussels, 2000
- [6] Andrea Zanetti Polzi, "Europe's North-South Technology Drive," European Research B.V., August 2000
- [7] Kathy Foley, "Divided States of Europe," NUA analysis, November 2001
- [8] Christy Pettey, "40 Percent of U.S. Adults are Regular Users of Mobile Telephony Services," Dataquest Inc, Gartner Group Inc., December 2000
- [9] Alasdair Cain and Mark Burris, "Investigation of the Use of Mobile Phones While Driving," Center for Urban Transportation Research, College of Engineering, U. of Southern Florida, April 1999
- [10] Tsushin Hakusko, "Telecommunications white paper," Ministry of Post and Telecommunications, Tokyo, 2000
- [11] Daniel Scuka, "Unwired—Japan Has the Future in Its Pocket," J@pan.Inc Magazine, July 2001
- [12] Clayton M. Christensen. Innovators Dilemma, Harper Business, 2000.
- [13] The TELDOK Yearbook 2001.
- [14] Svenska mobiltelemarknaden i ur ett konsument-och konkurrensperspektiv, PTS, 1999.
- [15] Mobiltelemarknaden i Sverige ur ett konsument-och konkurrensperspektiv, PTS, 2001.
- [16] GSM World. www.gsmworld.com, see news - subscriber statistics. June 2002.
- [17] EMC World Cellular Database. www.emc-database.com. June 2002.

- [18] Telecommunications Carriers Association. www.tca.or.jp. Japan. June 2002.
- [19] CDMA Development Group (CDG). www.cdg.org. June 2002
- [20] Vodafone. www.vodafone.com. June 2002
- [21] CIA World Fact book www.cia.gov/cia/publications/factbook/index.html
- [22] Eurostat. europa.eu.int/comm/eurostat/
- [23] Merriam Websters Collegiate dictionary <http://www.m-w.com/> 2002-06-26
- [24] OECD document: DSTI/ICCP/TISP(99)15/FINAL "TELECOMMUNICATIONS REGULATIONS: INSTITUTIONAL STRUCTURES AND RESPONSIBILITIES" Paris 2000
- [25] Noam Eli M. "Interconnecting the network of networks" MIT Press, Cambridge 2001. p. 150.
- [26] Noam Eli M. "Interconnecting the network of networks" MIT Press, Cambridge 2001. p. 34
- [27] http://www.salon.com/tech/fsp/2000/04/20/chapter_six_part_1/index1.html 2002-06-27
- [28] "ITU an overview" <http://www.itu.int/aboutitu/overview/index.html> 2002-06-27
- [29] <http://www.itu.int/aboutitu/overview/rca.html> 2002-06-27
- [30] Lonely Planet World Guide – Japan, http://www.lonelyplanet.com/destinations/north_east_asia/japan/culture.htm, 2002-06-27
- [31] G. Rahn, "Cultural Differences and Doing Business in Europe and Japan", <http://www.kcl.ac.uk/english/sympo/EUDialogue/rahn.htm>, 2002-06-27
- [32] K. Aoki, "Cultural Differences in E-Commerce: A Comparison between the U.S. and Japan", http://www.firstmonday.dk/issues/issue5_11/aoki/, 2002-06-27
- [33] C.H. Marcussen, "Comparing SMS and WAP in Europe with iMode in Japan", <http://www.crt.dk/uk/staff/chm/wap/smsimode.pdf>, January 2002
- [34] Analytictech, "Differences in Culture", <http://www.analytictech.com/mb021/cultural.htm>, 2002-06-27
- [35] Lonely Planet World Guide – USA, http://www.lonelyplanet.com/destinations/north_america/usa/culture.htm, 2002-06-27
- [36] C.H. Marcussen, "Mobile Data and M-Commerce in Europe", <http://www.crt.dk/uk/staff/chm/wap/sms.pdf>, April 2002
- [37] Jupiter MMXI survey group. <http://uk.jupitermmxi.com>

- [38] Forrester survey group. <http://www.forrester.com>
- [39] IDC survey group. <http://www.idc.com>
- [40] Newsbytes. 'Always On' Top Draw To Broadband. <http://216.239.39.100/search?q=cache:LjmnrwiKjo8C:www.newsbytes.com/news/02/176079.html+broadband+USA+survey&hl=en&ie=UTF-8>
- [41] "Broadband struggles to win over Europe". <http://news.bbc.co.uk/2/hi/business/1270242.stm>
- [42] Non-Profit Japan. <http://www.igc.org/ohdakefoundation/telecom/overview.htm>.
- [43] Cyber Atlas. <http://www.cyberatlas.com>.
- [44] Cyber Atlas. <http://www.yankeegroup.com>.
- [45] Nua Internet Surveys at Nua, March 2001. <http://www.nua.com/surveys>